HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	1 / 31
Document No.		Revision	1.0

HannStar Product Information

Model : **HSD150PX17**
-A00

(A00: sub model code)

Note:1.Please contact HannStar Display Corp. before designing your product based on this module
specification.
2.The information contained herein is presented merely to indicate the characteristics and perfor-
mance of our products. No responsibility is assumed by HannStar for any intellectual property
claims or other problems that may result from application based on the module described herein.

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	2 / 31
Document No.		Revision	1.0

Record of Revisions

Rev.	Date	Description of change
1.0		• HSD150PX17-A00 formal specification was first issued..

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	3 / 31
Document No.		Revision	1.0

Contents

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	4 / 31
Document No.		Revision	1.0

1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD150PX17-A is a color active matrix thin film transistor (TFT) liquid crystal display(LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 15 inch diagonally measured active display area with XGA resolution (768 vertical by 1024 horizontal pixel array) and can display up to 262,144 colors.

1.2 Features

- 15" XGA for Notebook PC
- LVDS interface.
- SPWG style-B standard
- High luminance
- Input timing: DE mode

1.3 Applications

- Notebook PC
- Moniputers
- Display terminals for AV applications
- Monitors for industrial applications

1.4 General information

Item	Specification	Unit
Outline Dimension	317.3(H) x 242.0(V) x 6.0(max)	
Display area	304.128(H) x 228.096(V) (15.0" diagonal)	mm
Number of Pixel	1024(H) x 768(V)	pixels
Pixel pitch	0.297(H) x 0.297(V)	mm
Pixel arrangement	RGB Vertical stripe	
Display color	262,144	colors
Display mode	Normally white	
Surface treatment	Antiglare, Hard-Coating(3H)	
Weight	560 (Typ.)	g
Back-light	Single CCFL (Side-Light type)	
Input signal	1-ch LVDS with EDID(following SPWG)	

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	5 / 31
Document No.		Revision	1.0

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal(H)	316.8	317.3	317.8	mm
	Vertical(V)	241.5	242.0	242.5	mm
	Depth(D)	---	---	6.0	mm
Weight (Without inverter)		---	560	575	g
Torgue of custom screw hole		---	---	1.8	Kgf•Cm

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	6 / 31
Document No.		Revision	1.0

2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Absolute Rating of Environment

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	T_{STG}	-20	60	^oC	
Operating temperature	T_{OPR}	0	50	^oC	(1)
Vibration(non-operating)	V_{NOP}		1.5	G	(2)
Shock(non-operating)	S_{NOP}	180		G	(3)
Storage humidity	H_{STG}	10	90	%RH	(3)
Operating humidity	H_{OP}	10	80	%RH	(4)
Low pressure(operating)	P_{LOP}	697		hPa	(5)
Low pressure(non-operating)	P_{LNOP}	116		hPa	(6)

Note (1) Storage / Operating temperature
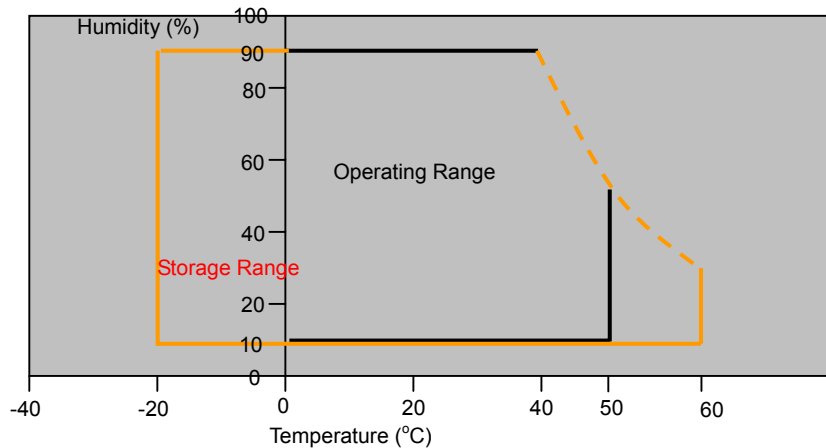
(2) 5-500-5Hz sine wave, X,Y,Z each directions, 30min/cycle.

(3)2ms, ±X, ±Y, ±Z direction, one time each. For this shock test, it is necessary to fill the silicon rubber between the shock jig as buffer.

(4) Max wet bulb temp.=39°C

(5) 2hrs. (10000 feet)

(6) 24hrs. (50000 feet)

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	7 / 31
Document No.		Revision	1.0

2.2 Electrical Absolute Rating

2.2.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Power supply voltage	V_{DD}	-0.3	4.0	V	(1) (2)
Logic input voltage	V_{IN}	-0.3	VDD+0.3	V	(1) (2)

2.2.2 Back-Light Unit

Item	Symbol	Min.	Max.	Unit	Note
Lamp voltage	V_{FL}	0	2000	$V_{(rms)}$	(1) (2)
Lamp current	I_L	--	8.0	mA	(1) (2)
Lamp frequency	f_L	0	100	kHz	(1) (2)

Note   (1) Permanent damage may occur to the LCD module if beyond this specification.
Functional operation should be restricted to the conditions described under normally operating conditions.

(2) Within Ta =25±2

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	8 / 31
Document No.		Revision	1.0

3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR		250	350			(1)(2)
Response time	Rising	T_R			7	13	msec	(1)(3)
	Falling	T_F			15	20		
White luminance (Average of 5 points)		Y_L		170	200		cd/m^2	(1)(4)(5) (I_L=6.0mA)
Color chromaticity (CIE1931)	Red	R_x	=0 =0 Normal viewing angle	0.583	0.585	0.586		(1)(4)
		R_y		0.350	0.351	0.352		
	Green	G_x		0.320	0.320	0.321		
		G_y		0.548	0.549	0.551		
	Blue	B_x		0.161	0.161	0.161		
		B_y		0.158	0.159	0.160		
	White	W_x		0.280	0.310	0.340		
		W_y		0.300	0.330	0.360		
Viewing angle (Min=Typ-5)	Hor.	L	CR>10	35	40			
		R		35	40			
	Ver.	U		15	20			
		D		35	40			
Brightness uniformity		B_{UNI}	=0	65			%	(6)
Crosstalk		CT(n)	=0			1.3	%	(7)

3.2 Measuring Condition

■ Measuring surrounding : dark room

■ Lamp current I_{FL} : 6.0±0.1mA(rms), Lamp freq. F_L=50KHz, Inverter : **HIU-757**

■ V_{DD}=3.3V±0.05V

■ Surrounding temperature : 25±2°C

■ 30min. Warm-up time.

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Document Title	HSD150PX17 Product Information	Page No.	9 / 31
Document No.		Revision	1.0

3.3 Measuring Equipment

■ Otsuka Electrics Corp., which utilized MCPD-7000 for Chromaticity
   and BM-5 for other optical characteristics.

■ Measuring spot size : 10 ~ 12 mm

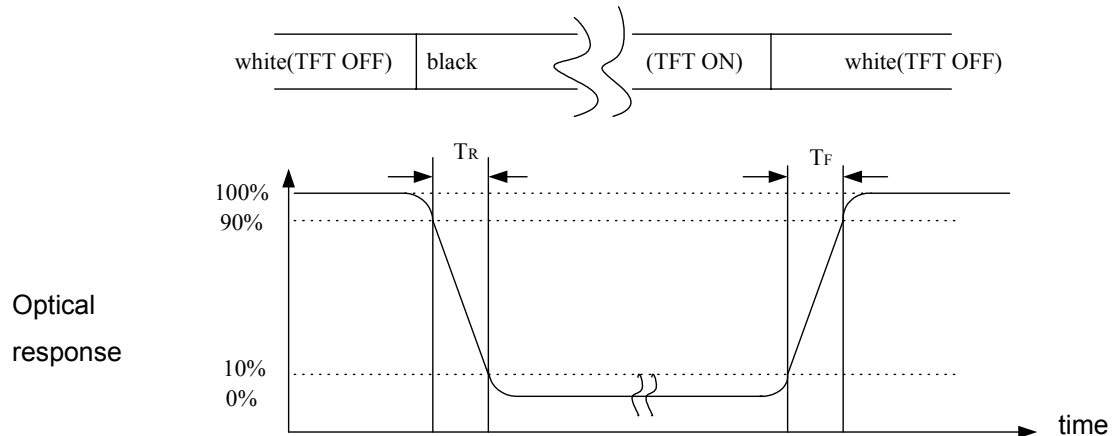Note (1) Definition of Viewing Angle :
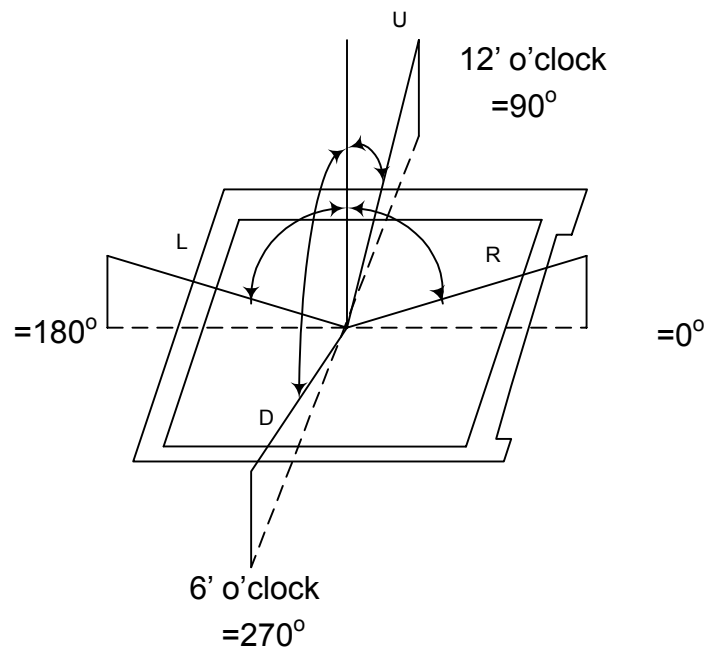
Note (2) Definition of Contrast Ratio(CR) :
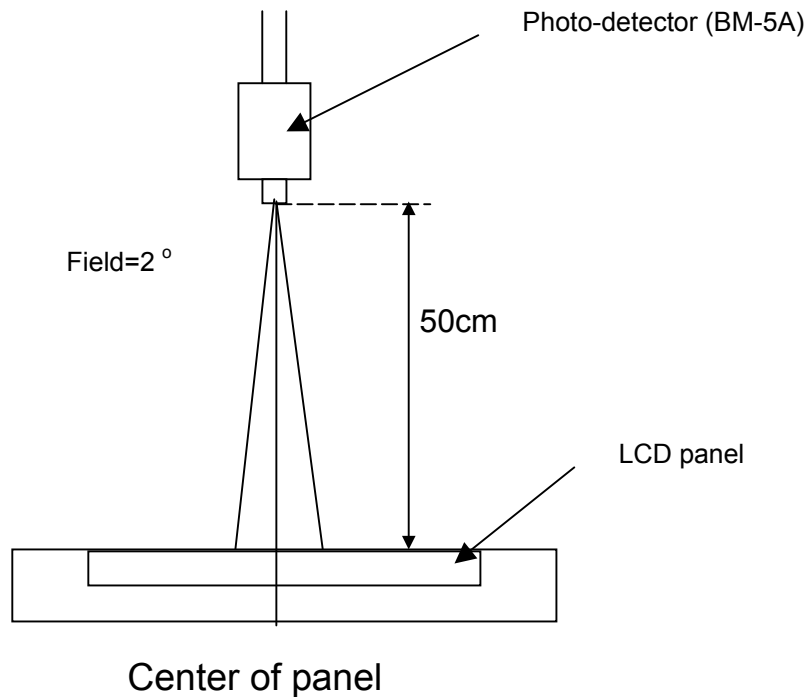   measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white (L63)}}{\text{Luminance with all pixels black (L0)}}$$

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Document Title	HSD150PX17 Product Information	Page No.	10 / 31
Document No.		Revision	1.0

Note (3) Definition of Response Time : Sum of T_R and T_F

white(TFT OFF)	black	(TFT ON)	white(TFT OFF)

Optical response

100%
90%
10%
0%

T_R T_F

time

Note (4) Definition of brightness uniformity

Photo-detector (BM-5A)

Field=2 °

50cm

LCD panel

Center of panel

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Document Title	HSD150PX17 Product Information	Page No.	11 / 31
Document No.		Revision	1.0

Note (5) Definition of Average Luminance of White (5 Point)

$$\text{Average Luminance} = \frac{Y_1 + Y_2 + Y_3 + Y_4 + Y_5}{5}$$
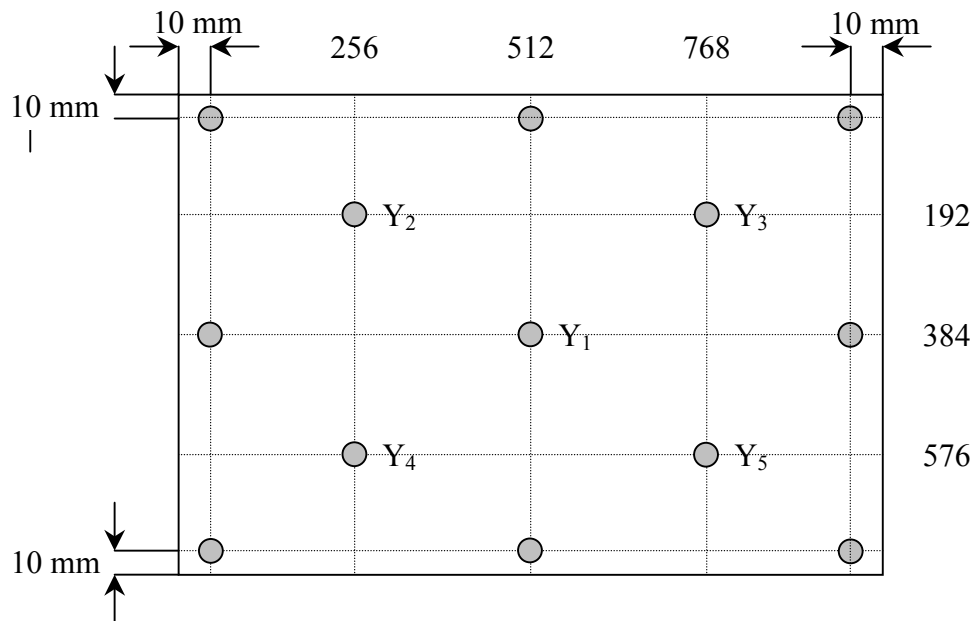
Note (6) Definition of brightness uniformity

$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 13 points})}{(\text{Max Luminance of 13 points})} \times 100\%$$

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	12 / 31
Document No.		Revision	1.0

Note (7) Definition of crosstalk   CT(1) ~ CT(4)

$$CT(n) = \frac{\left| L(n) - LB(n) \right|}{L(n)} \times 100\% \,, \; n = 1 \sim 4$$
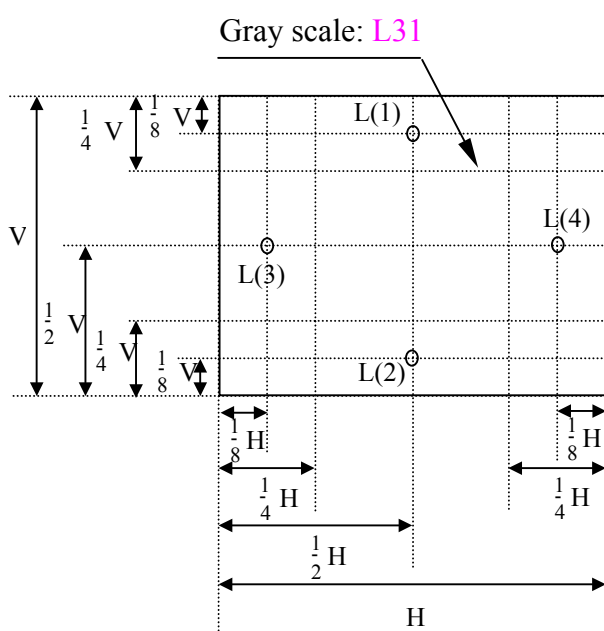
Where L(n) = Luminance of point "n" at pattern A (cd/m^2) , n=1 4

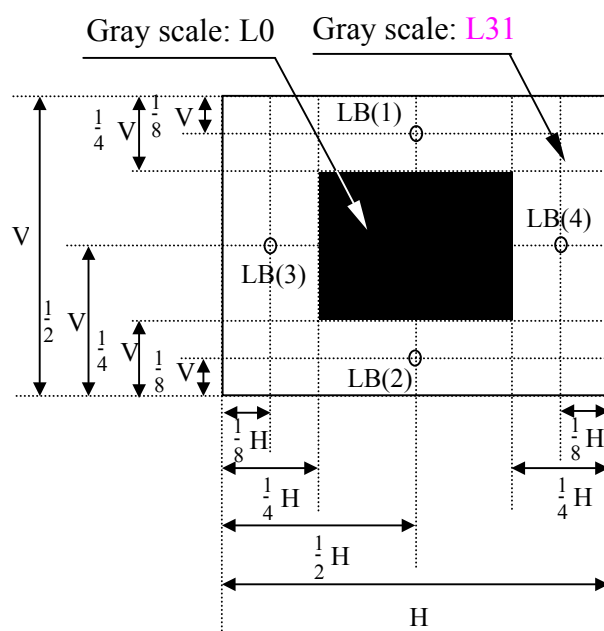LB(n) = Luminance of point "n" at pattern B (cd/m^2) , n=1 4

The location measured will be exactly the same in both patterns.

L0 : Luminance with all pixels black

L63 : Luminance with all pixels white

Pattern A   Pattern B
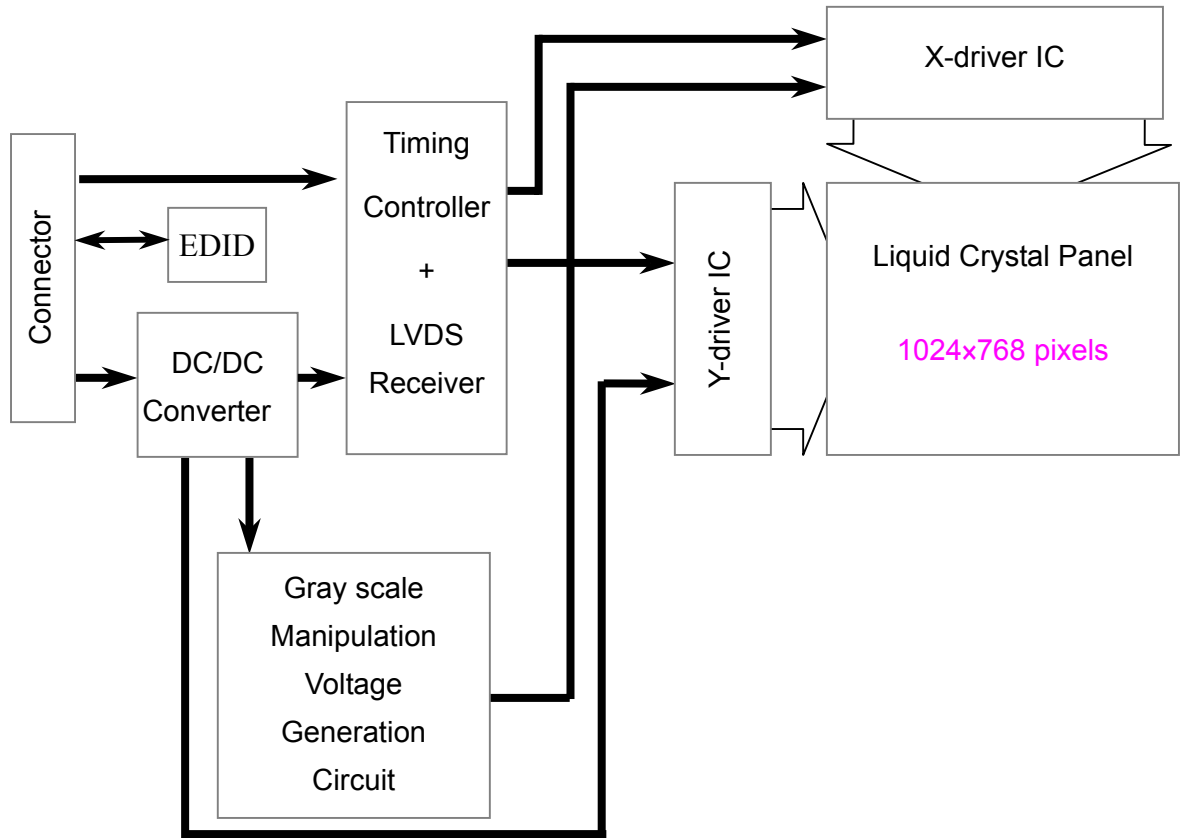
HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	13 / 31
Document No.		Revision	1.0

4.0 BLOCK DIAGRAM
4.1 TFT LCD Module

4.2 Back Light Unit

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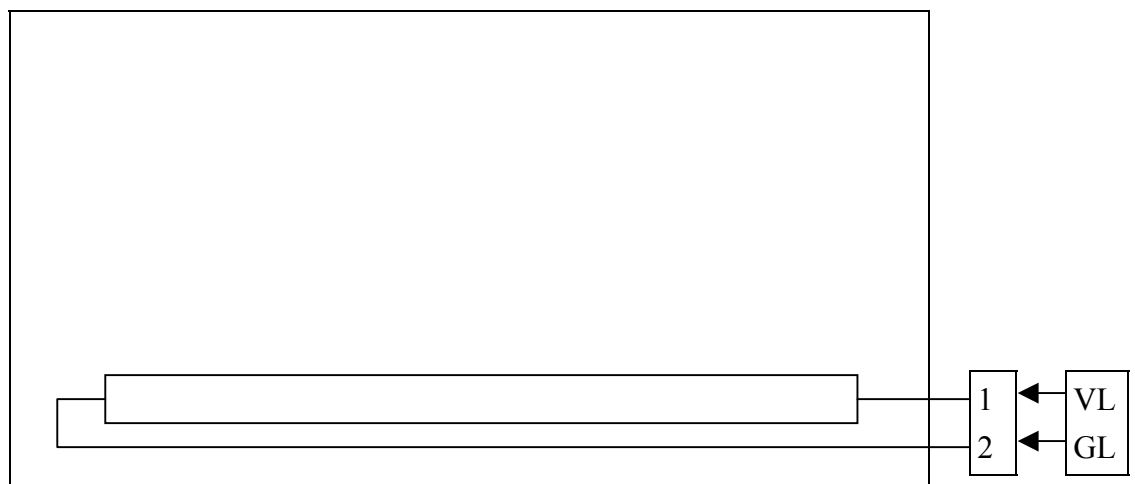
Document Title	HSD150PX17 Product Information	Page No.	14 / 31
Document No.		Revision	1.0

4.3 Pixel Format

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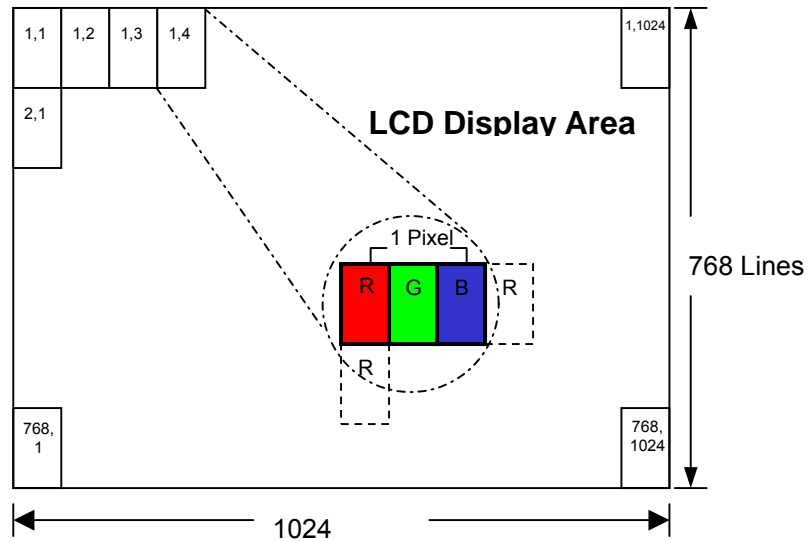
Document Title	HSD150PX17 Product Information	Page No.	15 / 31
Document No.		Revision	1.0

4.4 Relationship Between Displayed Color and Input

	Display	R5 (MSB)	R4	R3	R2	R1	R0 (LSB)	G5 (MSB)	G4	G3	G2	G1	G0 (LSB)	B5 (MSB)	B4	B3	B2	B1	B0 (LSB)	Gray scale level
Basic color	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	-
	Green	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	-
	Light Blue	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	-
	Red	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	-
	Purple	H	H	H	H	H	H	L	L	L	L	L	L	H	H	H	H	H	H	-
	Yellow	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L	-
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
Gray scale of Red	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
		L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L1
		L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L2
	Dark ↑ ↓ Light	⋮						⋮						⋮						L3…L60
		H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L61
		H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L62
	Red	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	Red L63
Gray scale of Green	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
		L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L1
		L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L2
	Dark ↑ ↓ Light	⋮						⋮						⋮						L3…L60
		L	L	L	L	L	L	H	H	H	H	L	H	L	L	L	L	L	L	L61
		L	L	L	L	L	L	H	H	H	H	H	L	L	L	L	L	L	L	L62
	Green	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	Green L63
Gray scale of Blue	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L1
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L2
	Dark ↑ ↓ Light	⋮						⋮						⋮						L3…L60
		L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	L	H	L61
		L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	L	L62
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	Blue L63
Gray scale of White & Black	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
		L	L	L	L	L	H	L	L	L	L	L	H	L	L	L	L	L	H	L1
		L	L	L	L	H	L	L	L	L	L	H	L	L	L	L	L	H	L	L2
	Dark ↑ ↓ Light	⋮						⋮						⋮						L3…L60
		H	H	H	H	L	H	H	H	H	H	L	H	H	H	H	H	L	H	L61
		H	H	H	H	H	L	H	H	H	H	H	L	H	H	H	H	H	L	L62
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	White L63

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	16 / 31
Document No.		Revision	1.0

4.5 RECOMMENDED TRANSMITTER TO HSD150PX17-A INTERFACE ASSIGNMENT

Case1: DATA (6bit transmitter)

DS90CF363				Output Signal Symbol	LTM15C425S Interface (CN1)	
Input Terminal No.		Input Signal (Graphics controller output signal)				
Symbol	Terminal	Symbol	Function		Terminal	Symbol
TIN0	44	R0	Red Pixels Display Data (LSB)	TOUT0- TOUT0+	No.8 No.9	IN0- IN0+
TIN1	45	R1	Red Pixels Display Data			
TIN2	47	R2	Red Pixels Display Data			
TIN3	48	R3	Red Pixels Display Data			
TIN4	1	R4	Red Pixels Display Data			
TIN5	3	R5	Red Pixels Display Data (MSB)			
TIN6	4	G0	Green Pixels Display Data (LSB)			
TIN7	6	G1	Green Pixels Display Data	TOUT1- TOUT1+	No.11 No.12	IN1- IN1+
TIN8	7	G2	Green Pixels Display Data			
TIN9	9	G3	Green Pixels Display Data			
TIN10	10	G4	Green Pixels Display Data			
TIN11	12	G5	Green Pixels Display Data (MSB)			
TIN12	13	B0	Blue Pixels Display Data (LSB)			
TIN13	15	B1	Blue Pixels Display Data			
TIN14	16	B2	Blue Pixels Display Data	TOUT2- TOUT2+	No.14 No.15	IN2- IN2+
TIN15	18	B3	Blue Pixels Display Data			
TIN16	19	B4	Blue Pixels Display Data			
TIN17	20	B5	Blue Pixels Display Data (MSB)			
TIN18	22	NC	Non Connection (open)			
TIN19	23	NC	Non Connection (open)			
TIN20	25	ENAB	Compound Synchronization Signal			
CLK IN	26	NCLK	Data Sampling Clock	TCLK OUT- TCLK OUT+	No.17 No.18	CLK- CLK+

Note : Please connect NC pin to nothing. Don't connect it to ground nor to other signal input.

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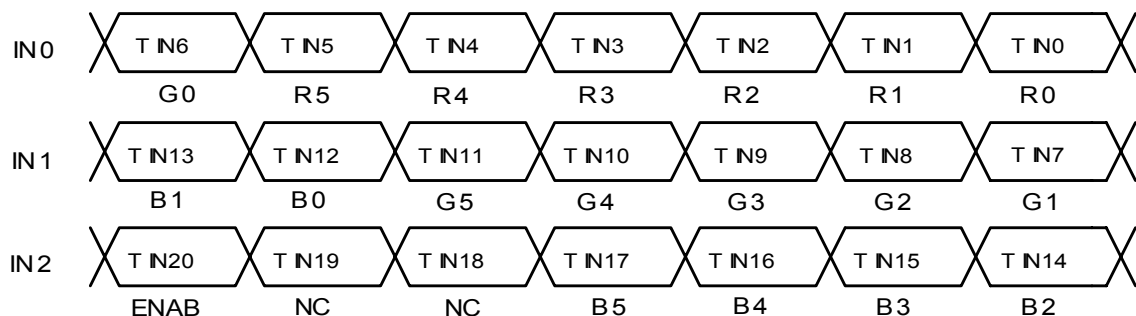
Document Title	HSD150PX17 Product Information	Page No.	17 / 31
Document No.		Revision	1.0

5.0 INTERFACE PIN CONNECTION

5.1 TFT LCD Module

CN1 (INPUT SIGNAL): FI-XB30S-HF10 (JAE)

MATING CONNECTOR: FI-X30M,FI-X30MR

Terminal no.	Symbol	Function	Note
1	GND	Ground	
2	VDD	Power Supply : 3.3V(typical)	
3	VDD	Power Supply : 3.3V(typical)	
4	VEDID	DDC 3.3V power	
5	NC	Reserved for supplier test point	
6	ClkEDID	DDC clock	
7	DATAEDID	DDC data	
8	IN0-	- LVDS differential data input (R0-R5, G0)	(2)
9	IN0+	+ LVDS differential data input (R0-R5, G0)	(2)
10	GND	Ground	
11	IN1-	- LVDS differential data input (G1-G5, B0-B1)	(2)
12	IN1+	+ LVDS differential data input (G1-G5, B0-B1)	(2)
13	GND	Ground	
14	IN2-	- LVDS differential data input (B2-B5,DE)	(2)
15	IN2+	+ LVDS differential data input (B2-B5, DE)	(2)
16	GND	Ground	
17	CLK-	- LVDS differential clock input	(2)
18	CLK+	+ LVDS differential clock input	(2)
19	GND	Ground	
20	NC	Reserved for supplier test point	(1)
21	NC	Reserved for supplier test point	(1)
22	GND	Ground	
23	NC	Reserved for supplier test point	(1)
24	NC	Reserved for supplier test point	(1)
25	GND	Ground	
26	NC	Reserved for supplier test point	(1)
27	NC	Reserved for supplier test point	(1)
28	GND	Ground	
29	NC	Reserved for supplier test point	(1)
30	NC	Reserved for supplier test point	(1)

Note (1) Please connects NC pin to nothing. Don't connect it to ground nor to other signal input. (NC pin should be open.)

Note (2) The module used a 100ohm resistor between positive and negative data lines of each receiver input.

5.2 Back-Light Unit

CN2 CCFL Power Source (**BHSR-02VS-1**) / JAPAN SOLDERLESS TERMINAL MFG CO., LTD.

Mating Connector: (**SBHT-002T-P0.5**) / JAPAN SOLDERLESS TERMINAL MFG CO., LTD.

Terminal no.	Symbol	Function
1	VL	CCFL power supply (high voltage)
2	GL	CCFL power supply (low voltage)

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	18 / 31
Document No.		Revision	1.0

6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of power supply		V_{DD}	3.0	3.3	3.6	V	
Current of power supply	V-Color	I_{DD1}	237	337	437	mA	(1)
	Mosaic	I_{DD2}	266	366	466	mA	(1)
Vsync frequency		f_V	---	60	---	Hz	(2)
Hsync frequency		f_H	---	48.36	---	KHz	
Frequency		f_{DCLK}	---	65.00	---	MHz	
Input rush current		I_{Rush}	---	---	1.5	A	(3)

Note (1)

1). V-Color :
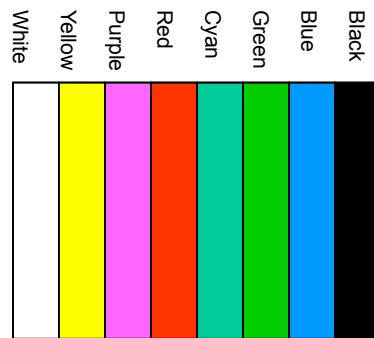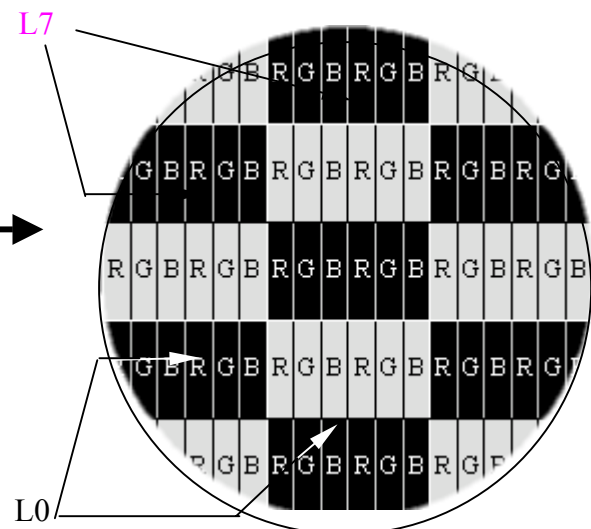

2). Mosaic : Dot checker image
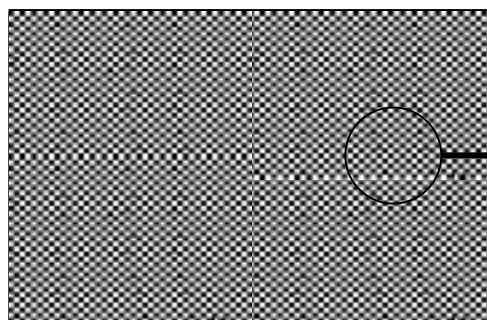
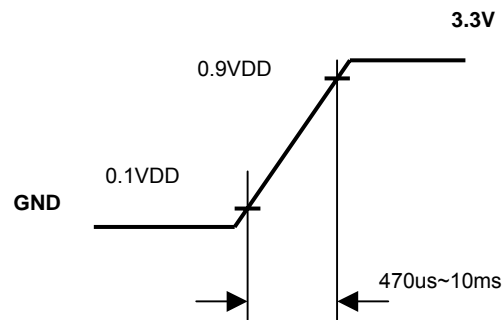Grey scale: L0   L63.
L0: Luminance with all pixels black.
L63: Luminance with all pixels white.

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Document Title	HSD150PX17 Product Information	Page No.	19 / 31
Document No.		Revision	1.0

Note (2) When fv is too low, a flicker may be occurred on the display.
Note (3) **Input Rush Current condition**

3.3V

0.9VDD

0.1VDD

GND

470us~10ms

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	20 / 31
Document No.		Revision	1.0

6.2 Back-Light Unit

The back-light system is an edge-lighting type with 1 CCFL(Cold Cathode Fluorescent Lamp). The characteristics of the lamp is shown in the following tables.

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp current	IL	**3.0**	**6.0**	**7.0**	mA(rms)	(1)
Lamp voltage	VL	**580**	**640**	**700**	V(rms)	I_L=6.0mA
Frequency	fL	**40**	**50**	**80**	KHz	(2)
Operating lamp life time	Hr	**10,000**	--	--	Hour	(3)
Startup voltage	Vs	**1250**	--	--	V(rms)	at 25°C
		1600				at 0°C

Note (1) Lamp current is measured with current meter for high frequency as shown below. Specified valued are for a lamp.

LCD MODULE

RED
WHITE(Ground)
1
2
A
INVERTER
(**HIU 757-22pF**)
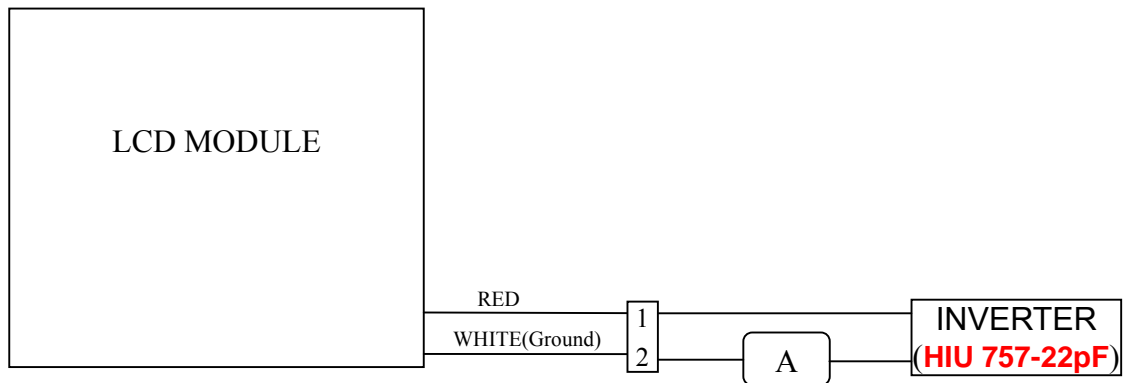
Note (2) Lamp frequency may produce interference with horizontal synchronous frequency and this may cause line flow on the display. Therefore lamp frequency shall be detached from the horizontal synchronous frequency and its harmonics as far as possible in order to avoid interference.

Note (3) Lamp life time (Hr) can be defined as the time in which it continues to operate under the condition : Ta=25±3°C, I_L=6.0mA(rms) and f_L=50kHz   until one of the following event occurs :
1. When the brightness becomes 50%
2. When the startup voltage(Vs) at 0°C becomes higher than the minimal Value of Vs specified above.

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	21 / 31
Document No.		Revision	1.0

6.3 Timing Parameters (DE mode)

Item		Symbol	Min.	Typ.	Max.	Unit	Remarks
Vertical display term	Period	t1	778×t4	806×t4 16.67	860×t4	ms	1) 5)
	Active	t2		768×t4 15.88		ms	1)
	Display start	t3	4×t4			ms	1)
Horizontal display term	Period	t4	1180×t7	1344×t7 20.68	1400×t7	μs	1) 5)
	Active	t5		1024×t7 15.76		μs	1)
	Display Start	t6	32×t7			μs	1)
Clock	Period	t7		15.38		ns	5)
	Low time	t8	5			ns	
	High time	t9	5			ns	
Data	Setup time	t10	2			ns	
	Hold time	t11	5			ns	

Note 1) Refer to TIMING CHART at page18, 19 and 20.

Note 2) In case of using the long frame period, the deterioration of display quality, noise etc. may be occurred.

Note 3) When ENAB is fixed to "L" level after NCLK input, the panel is displayed as black. However, a flicker may be occurred on the display. When ENAB is fixed to "H" level after NCLK input, the panel will be damaged.

Note 4) Do not fix NCLK to "H" or "L" level while the V_{DD} (+3.3V) is supplied. If NCLK is fixed to "H" level or "L" level for certain period while the V_{DD} (+3.3V) is supplied, the panel may be damaged.

Note 5) Do not change t1 and t4 values in the operation. When t1 or t4 is changed, the panel is displayed as black.
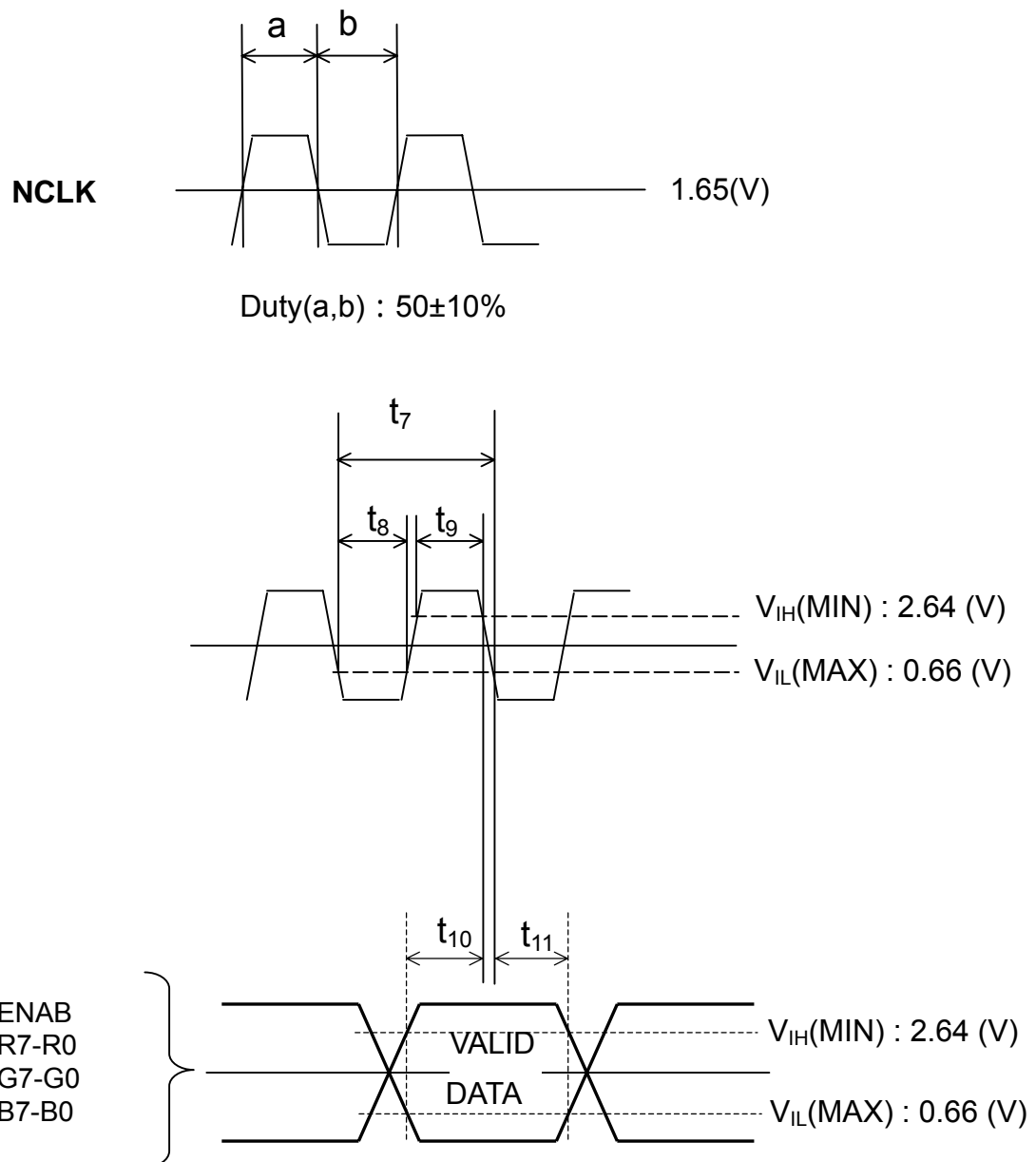
Note 6) Please adjust LCD operating signal timing and FL driving frequency, to optimize the display quality. There is a possibility that flicker is observed by the interference of LCD operating signal timing and FL driving condition (especially driving frequency).

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Document Title	HSD150PX17 Product Information	Page No.	22 / 31
Document No.		Revision	1.0

6.4 Timing Chart

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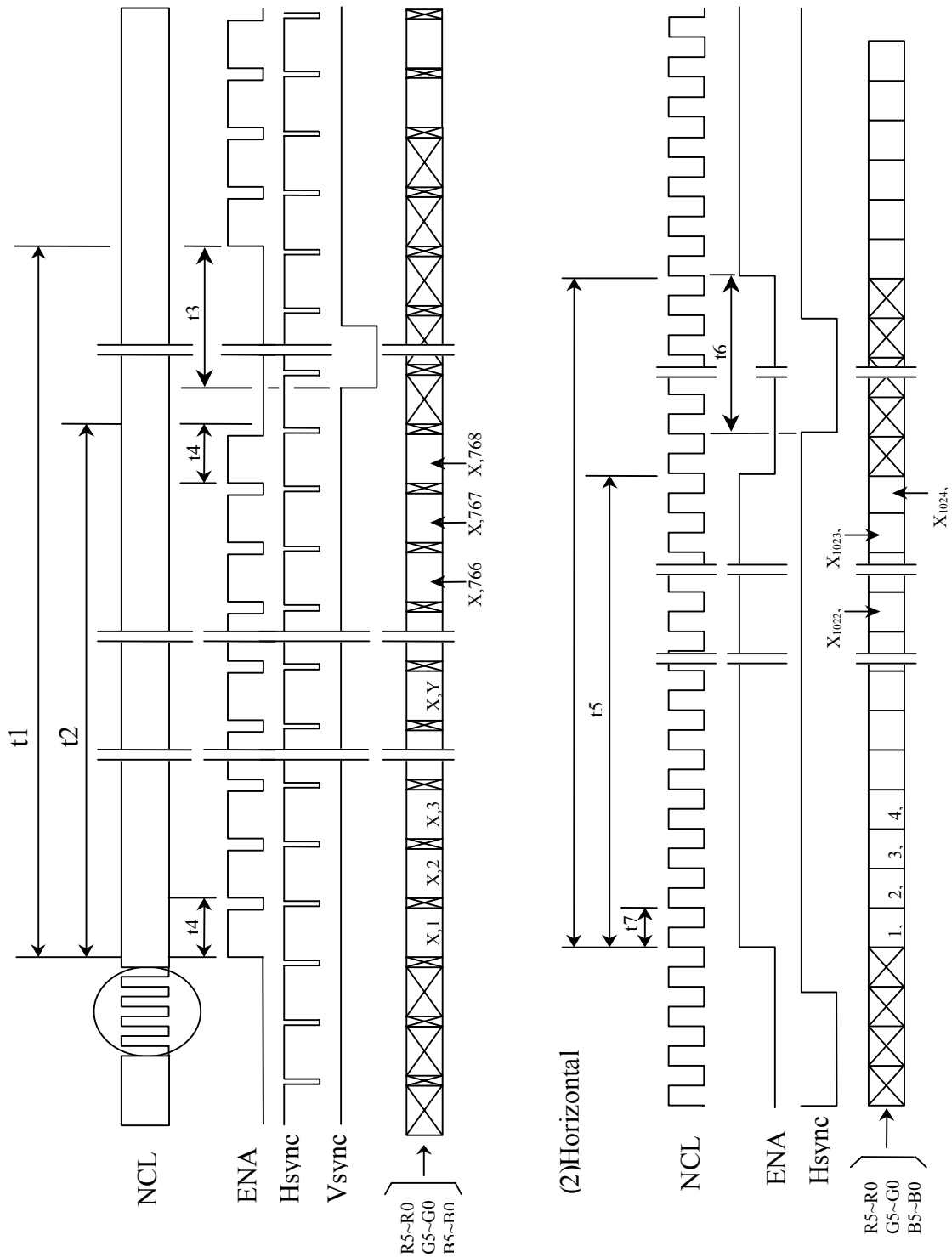
Document Title	HSD150PX17 Product Information	Page No.	23 / 31
Document No.		Revision	1.0

NCLK

a | b

1.65(V)

Duty(a,b) 50±10%

t_7

t_8 | t_9

V_{IH}(MIN) : 2.64 (V)

V_{IL}(MAX) : 0.66 (V)

t_{10} | t_{11}

ENAB
R7-R0
G7-G0
B7-B0

VALID
DATA

V_{IH}(MIN) : 2.64 (V)

V_{IL}(MAX) : 0.66 (V)

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Document Title	HSD150PX17 Product Information	Page No.	24 / 31
Document No.		Revision	1.0

6.5 Power ON/OFF Sequence
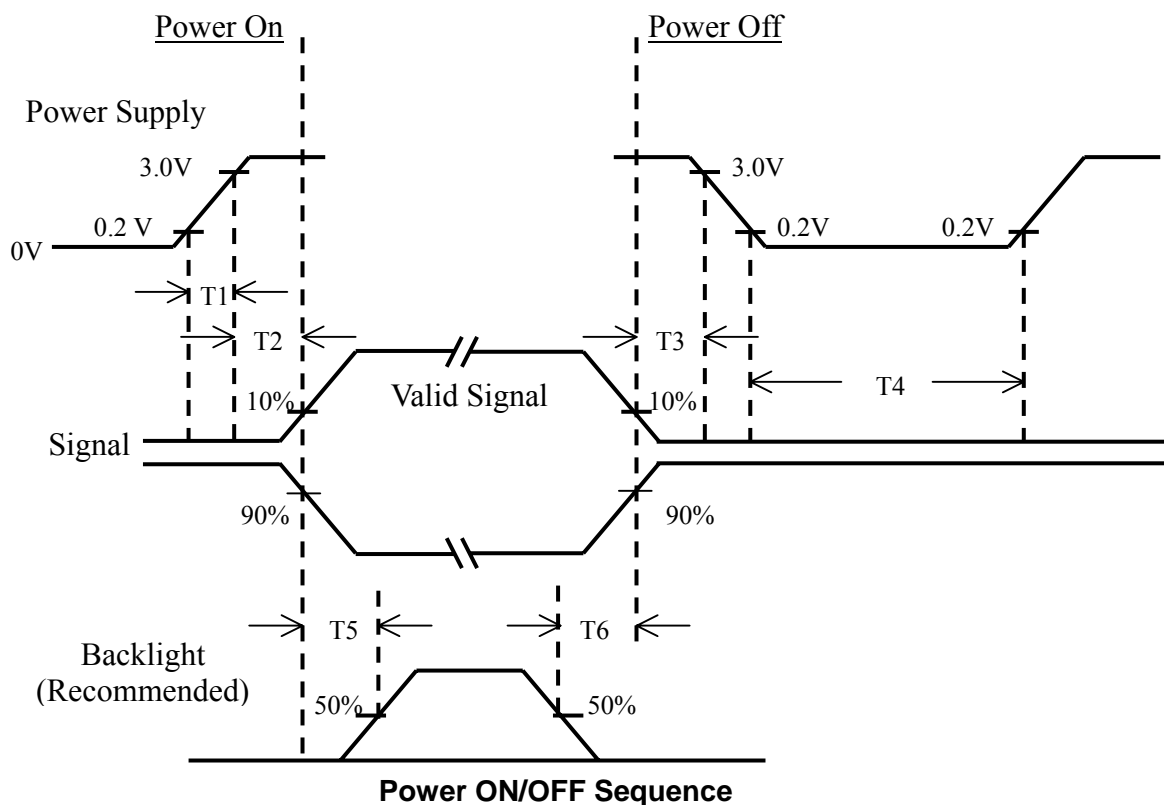
Power ON/OFF Sequence

470 us < T1 ≤ 10 msec   Back-ligh:

0 < T2 ≤ 50 msec   200 msec ≤ T5

0 < T3 ≤ 50 msec: 200 msec < T6

400mses < T4

Note (1) The supply voltage of the external system for the module input should be the same
        as the definition of V_{DD}.

(2) Apply the lamp volatge within the LCD operation range. When the back-light turns
    on before the LCD operation or the LCD truns off before the back-light turns off,
    the display may momentarily become white.

(3) In case of V_{DD} = off level, please keep the level of input signal on the low or keep a
    high impedance.

(4) T4 should be measured after the module has been fully discharged between power
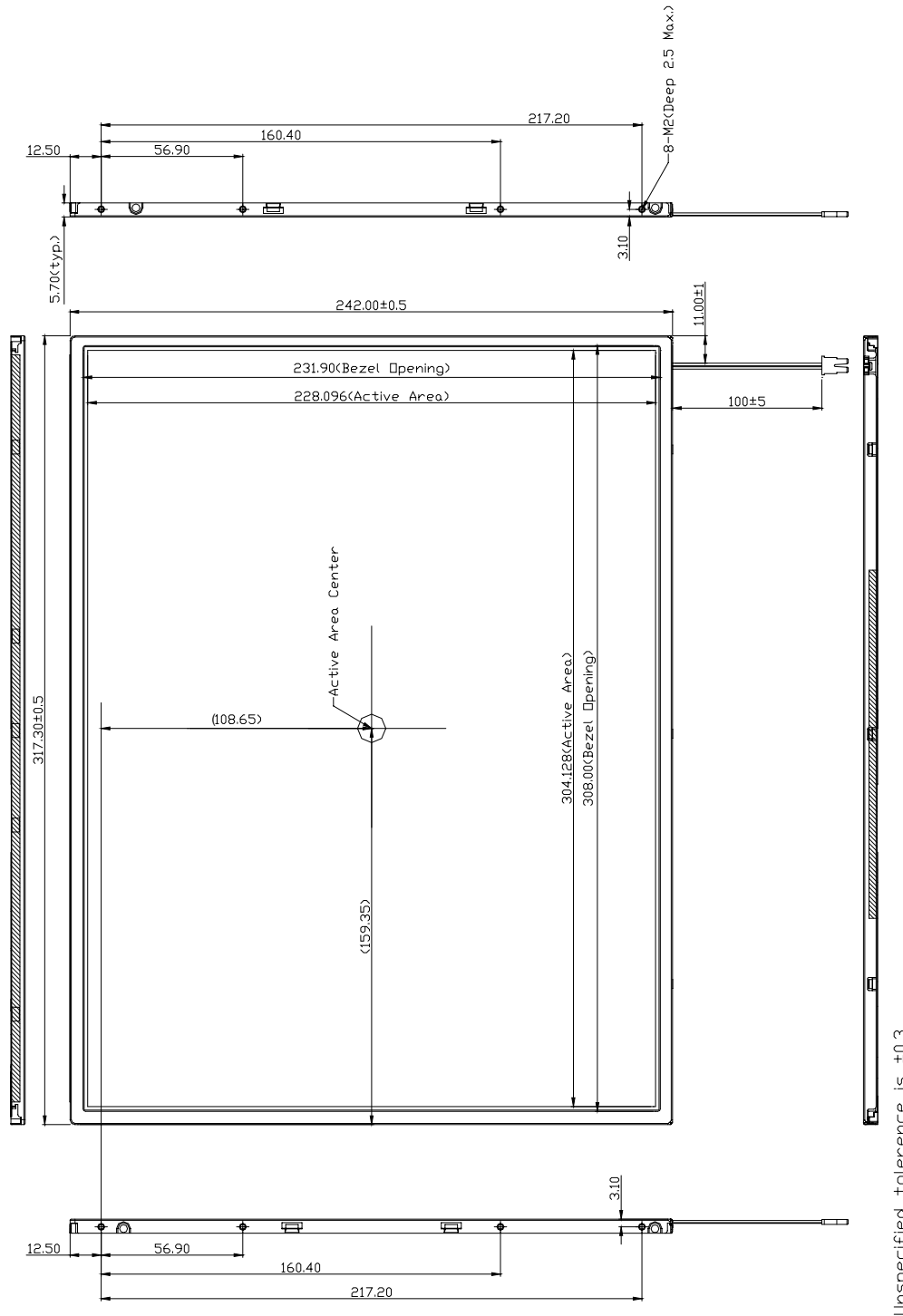   off and on period.

(5) Interface signal shall not be kept at high impedance when the power is on.

7.0 OUTLINE DIMENSION

7.1 Front View Outline Dimension

Unit : mm

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Document Title	HSD150PX17 Product Information	Page No.	26 / 31
Document No.		Revision	1.0

7.2 Back View Outline Dimension

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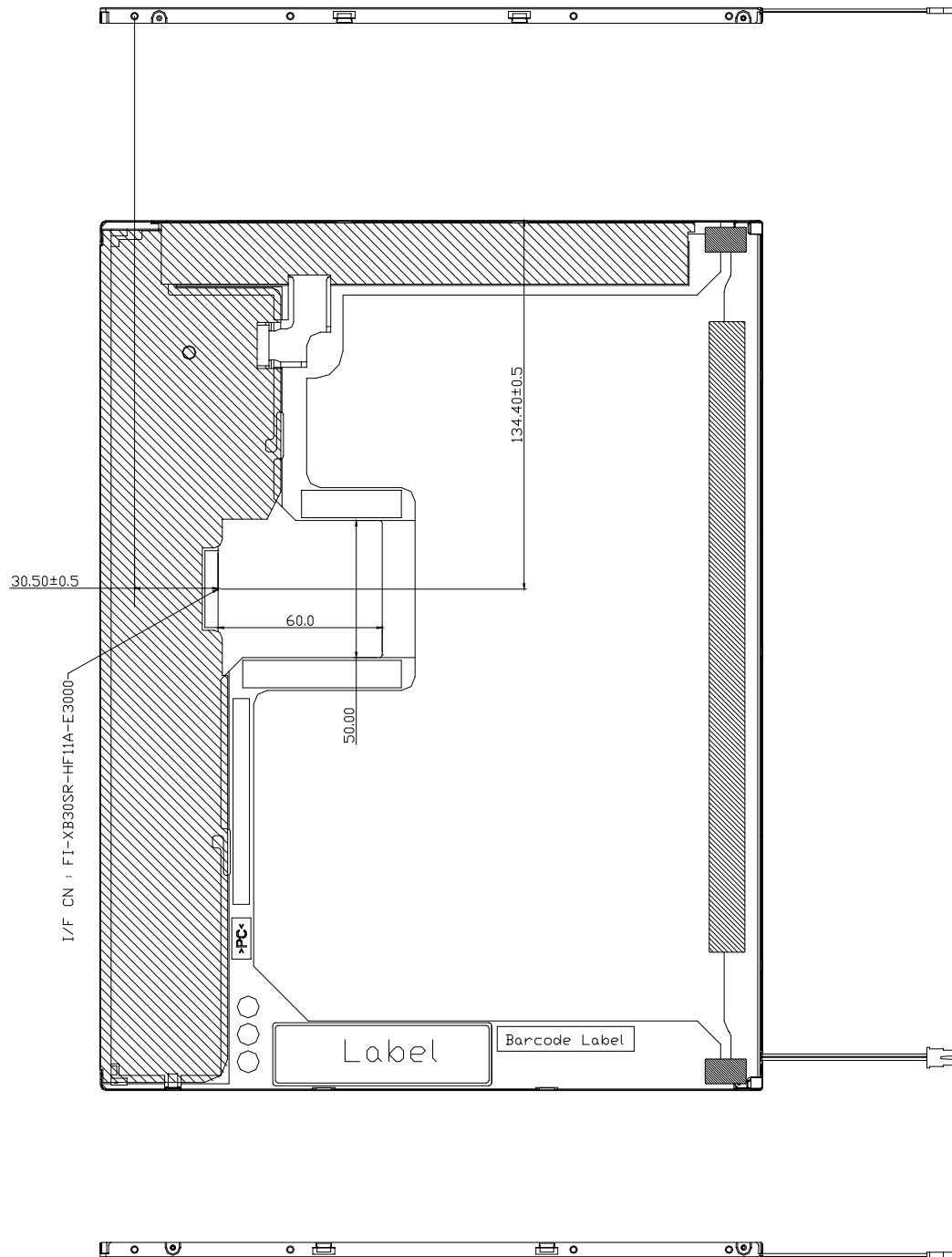
Document Title	HSD150PX17 Product Information	Page No.	27 / 31
Document No.		Revision	1.0

7.3 Tolerance of distance between active area and bezel opening

a   b   **0.9** mm

c   d   **0.9** mm

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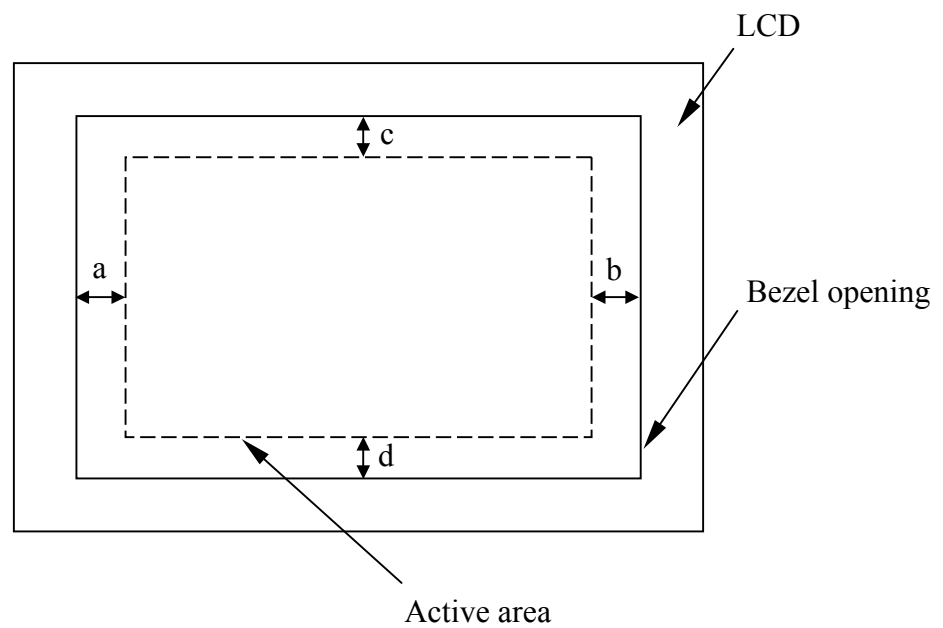
Document Title	HSD150PX17 Product Information	Page No.	28 / 31
Document No.		Revision	1.0

8.0   LOT MARK

8.1   Lot Mark

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

code 1,2,3,4,5,6: HannStar internal flow control code.
code 7: production location.
code 8: production year.
code 9: production month.
code 10,11,12,13,14,15: serial number.

Note (1) Production Year

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mark	9	0	1	2	3	4	5	6	7	8

Note (2) Production Month

Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct	Nov.	Dec.
Mark	1	2	3	4	5	6	7	8	9	A	B	C

8.2   Location of Lot Mark

(1) The label is attached to the backside of the LCD module.
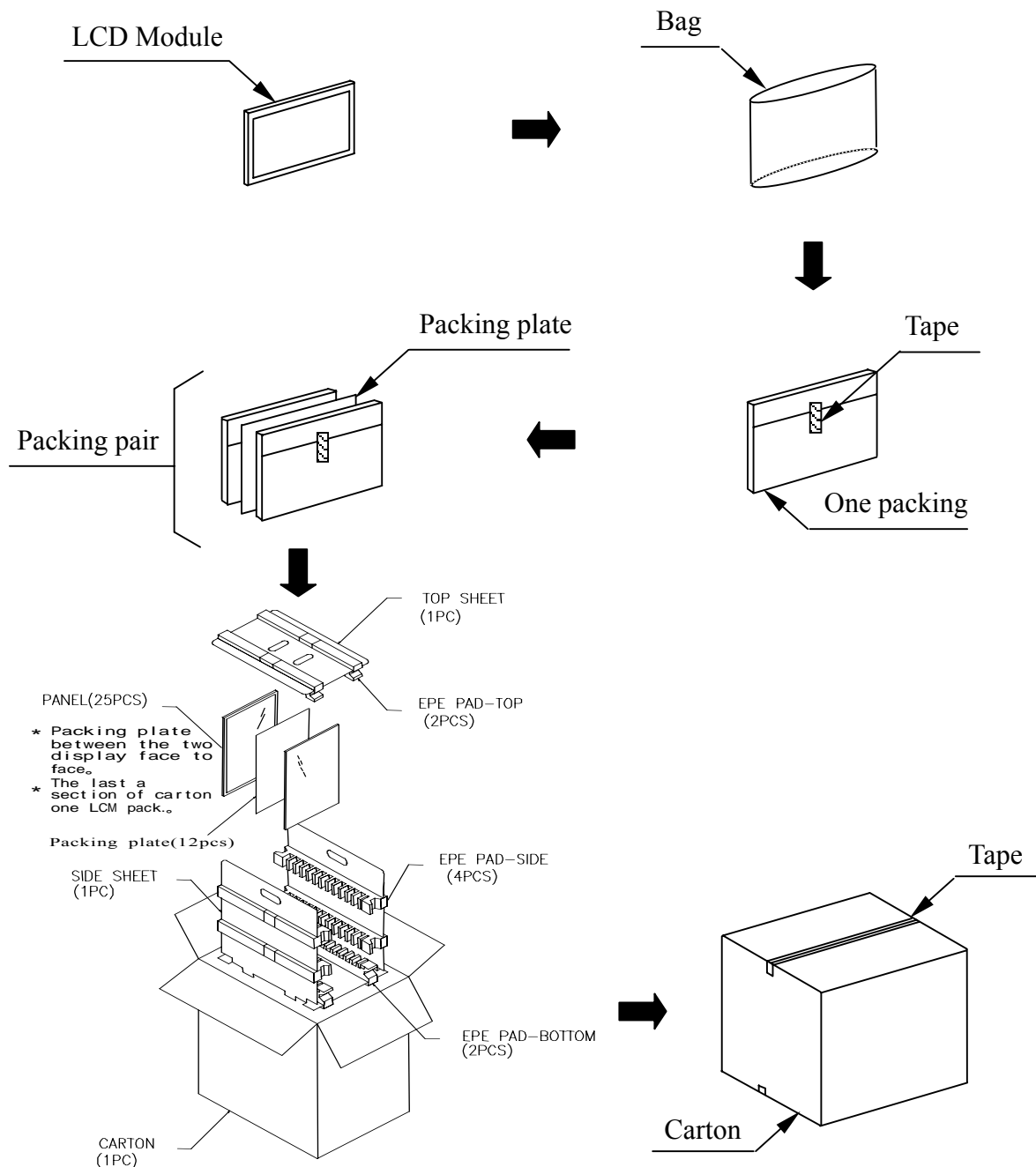(2) This is subject to change without prior notice.

EDID Ver.

HSD150PX17
-A00
Rev:

ED X.X
HannStar Display Corporation
MADE IN TAIWAN

* A 0 K 9 C 0 0 0 A 0 0 0 0 0 3 *

Lot mark

HannStar HannStar Display Corp.
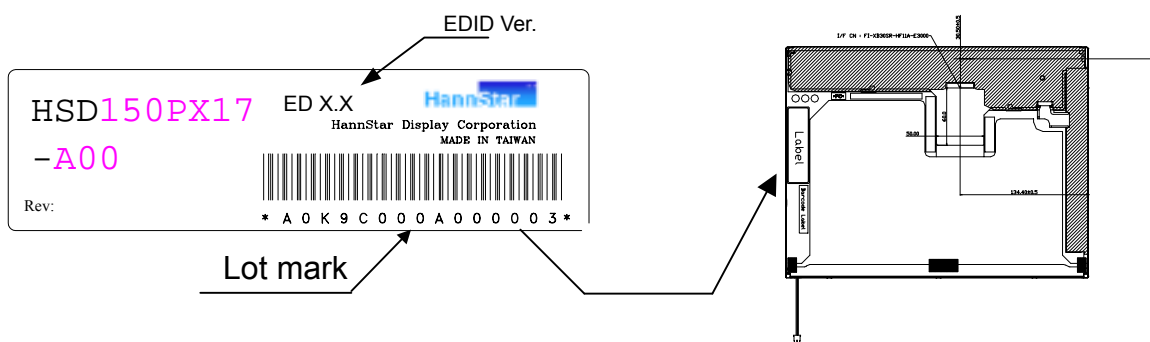
Document Title	HSD150PX17 Product Information	Page No.	29 / 31
Document No.		Revision	1.0

9.0 PACKAGE SPECIFICATION

9.1 packing form

(1) package quantity in one carton: 25 pieces.

(2) carton size: 464±3 mm×360±3 mm×431H±3 mm.

(3) for domestic transportation only.

9.2 packing assembly drawings

LCD Module

Bag

Packing plate

Tape

Packing pair

One packing

TOP SHEET
(1PC)

EPE PAD−TOP
(2PCS)

PANEL(25PCS)

* Packing plate between the two display face to face
* The last a section of carton one LCM pack.

Packing plate(12pcs)

EPE PAD−SIDE
(4PCS)

SIDE SHEET
(1PC)

Tape

EPE PAD−BOTTOM
(2PCS)

CARTON
(1PC)

Carton

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	30 / 31
Document No.		Revision	1.0

10.0   GENERAL PRECAUTION

10.1   Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

10.2   Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. HannStar does not warrant the module, if customers disassemble or modify the module.

10.3   Breakage of LCD Panel

2.2.1   If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

2.2.2   If liquid crystal contacts mouth or eyes, rinse out with water immediately.

2.2.3   If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

2.2.4   Handle carefully with chips of glass that may cause injury, when the glass is broken.

10.4   Electric Shock

10.4.1   Disconnect power supply before handling LCD module.

10.4.2   Do not pull or fold the CCFL cable.

10.4.3   Do not touch the parts inside LCD modules and the fluorescent lamp's connector or cables in order to prevent electric shock.

10.5   Absolute Maximum Ratings and Power Protection Circuit

10.5.1   Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.

10.5.2   Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

10.5.3   It's recommended to employ protection circuit for power supply.

10.6   Operation

10.6.1   Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

10.6.2   Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

10.6.3   When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

HannStar Display Corp.

Document Title	HSD150PX17 Product Information	Page No.	31 / 31
Document No.		Revision	1.0

10.6.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

10.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

10.7 Mechanism

Please mount LCD module by using mouting holes arranged in four corners tightly.

10.8 Static Electricity

10.8.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

10.8.2 Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

10.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

10.10 Disposal

When disposing LCD module, obey the local environmental regulations.